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Green Duwamish Watershed Advisory Group

# Climate adaptation and Seattle Public Utilities

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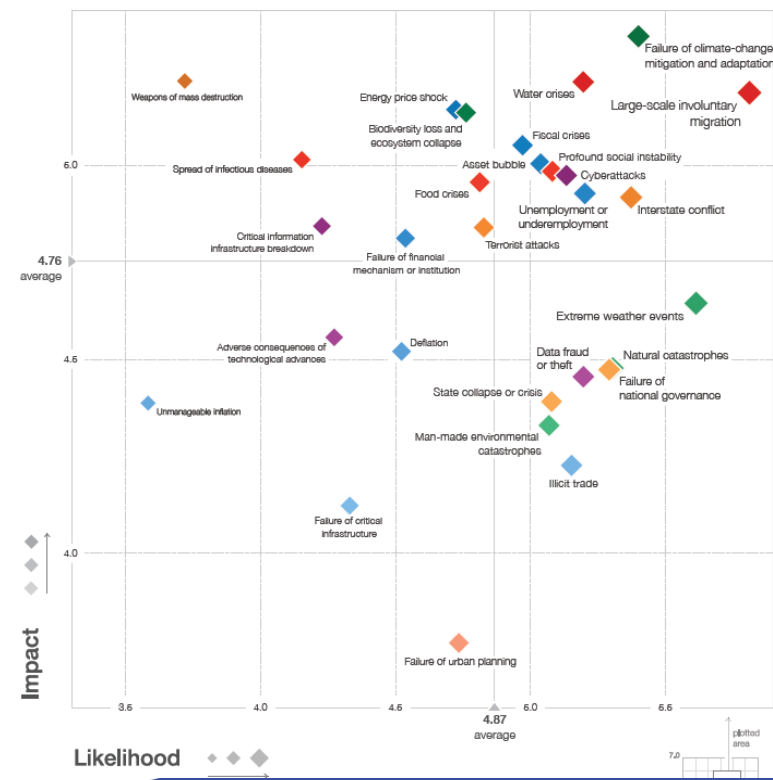


# water and climate change challenges

- physical
  - projecting timing and magnitude of changes
  - assessing implications
- assets and services
  - compromised asset functionality
  - essential services interrupted
- institutional
  - threats to mission
  - water as a connector not a sector
  - acknowledging the strategic imperative
  - building capacity
  - developing response strategies



Figure 1: The Global Risks Landscape 2016



# climate program objectives:

- build sustained capacity to manage the risks of climate change by:
  - enhancing knowledge
  - assessing impacts and vulnerabilities
  - building collaborative partnerships
  - strengthening institutions and people
  - pursuing portfolios of approaches
- leverage sustained capacity to embed what we're learning in what we do
  - strategic planning
  - system planning
  - capital planning
  - system operations

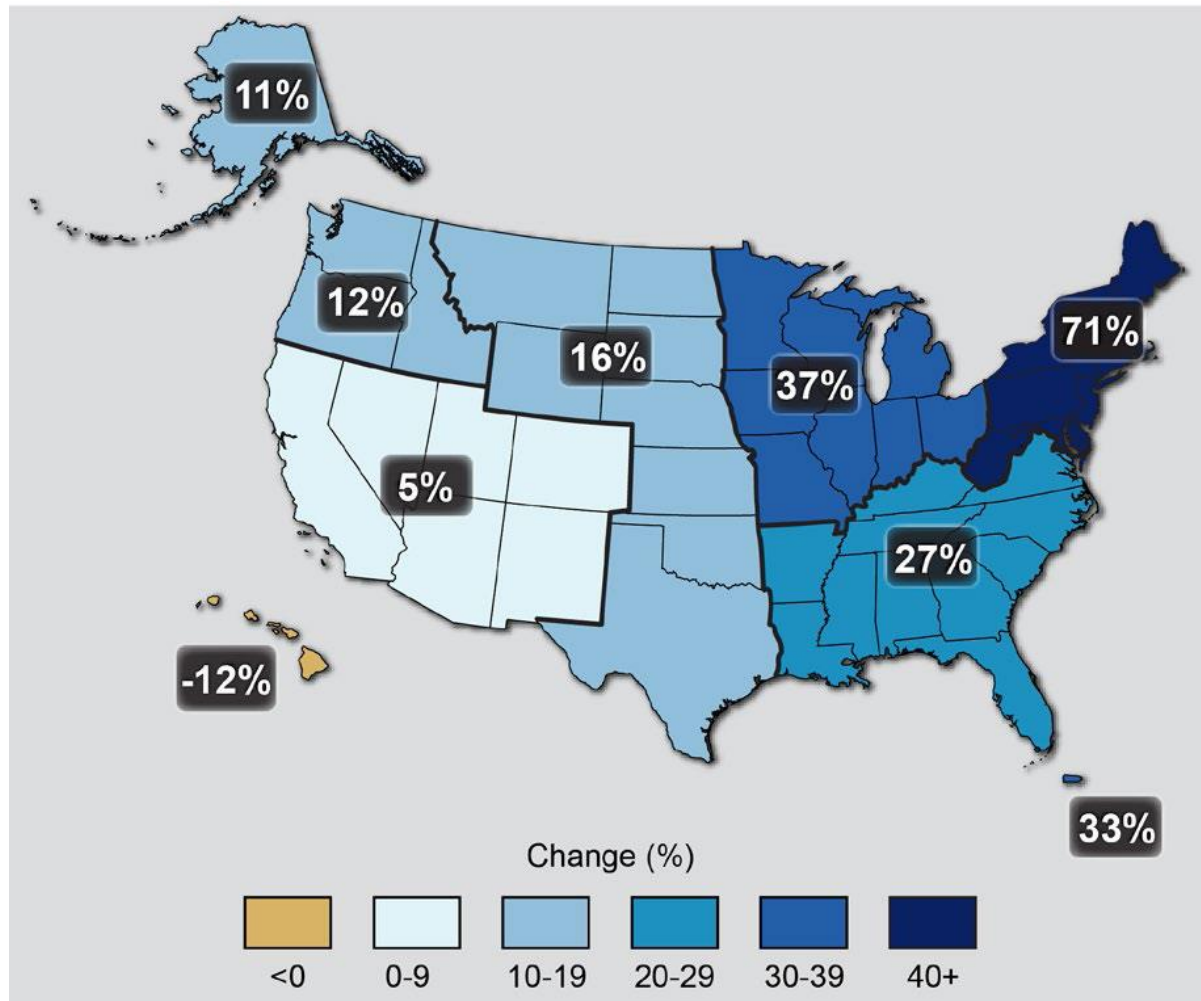






# climate change and the water cycle

- very heavy precip events have increased and are expected to increase



2014 National Climate Assessment

# SEATTLE LAND AREA IMPACTS

**2FT**  
ABOVE MHHW



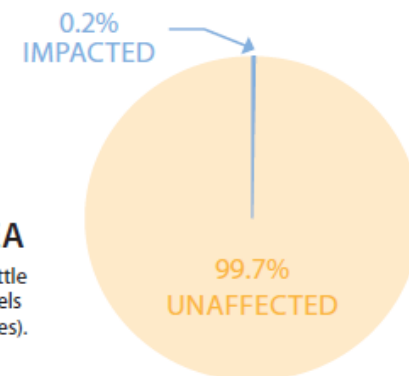
Year of Occurrence: <b>FREQUENCY</b>	BASELINE		IMPACTED	
	Total Area (acres)	% of Total Seattle Land Area	Total Area Impacted	% of Total Baseline Seattle Land Area*
<b>Now: ANNUALLY</b>				
<b>2035: MONTHLY</b>				
<b>2060: DAILY</b>				
<b>SEATTLE LAND AREA</b>	<b>53,238</b>	<b>100%</b>		
<b>2FT ABOVE MHHW (11' NAVD88)</b>			<b>120 acres</b>	<b>0.2%</b>

At 2 feet above MHHW, 120 acres - representing 0.2% of Seattle's total land area - will be impacted. The frequency of this flooding occurs annually now, and is projected to increase to monthly by 2035, and daily by 2060.

*\*The Baseline Area for inundation is the total Seattle Land Area*

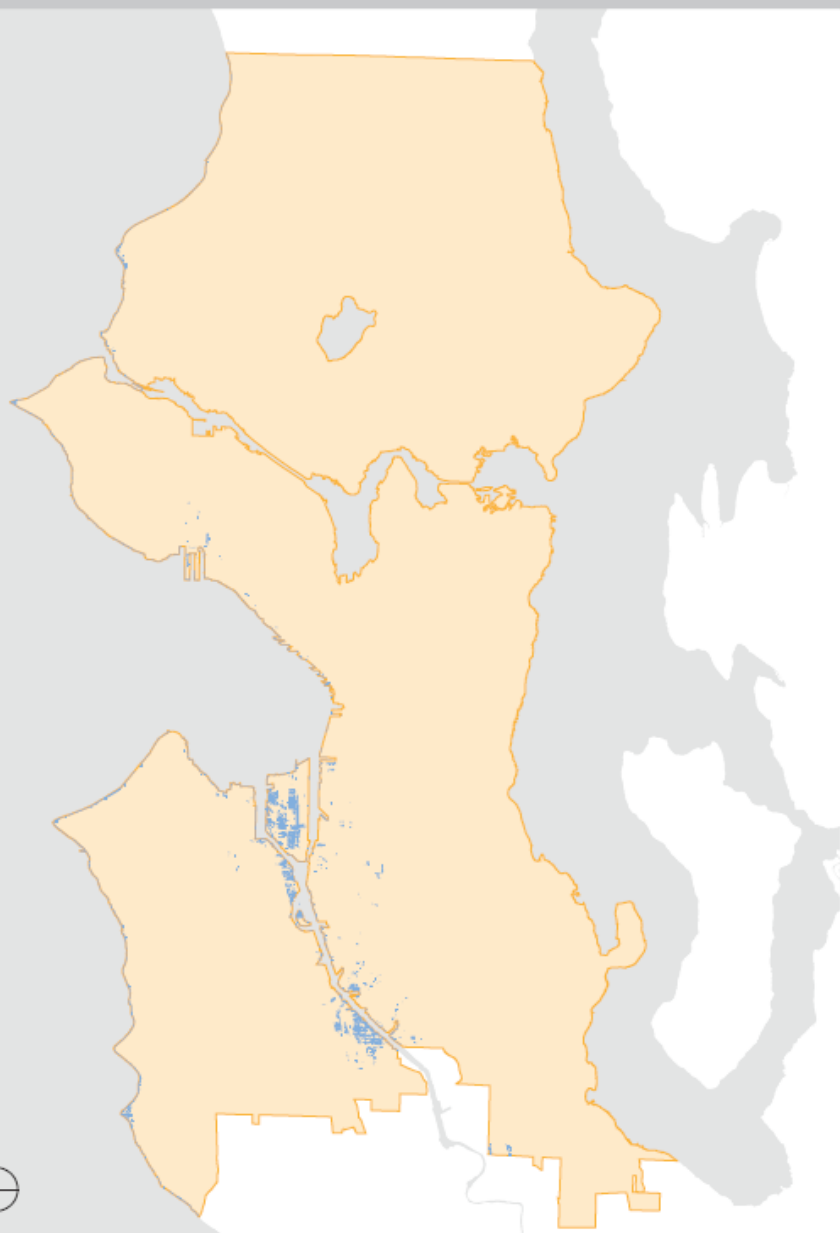
## 2FT IMPACTS TO LAND AREA

The pie chart shows the percentage of total Seattle Land Area (53,238 acres) impacted by water levels 2FT above MHHW (Total Area Impacted 120 acres).



# SEATTLE LAND AREA IMPACTS

**3FT**  
ABOVE MHHW



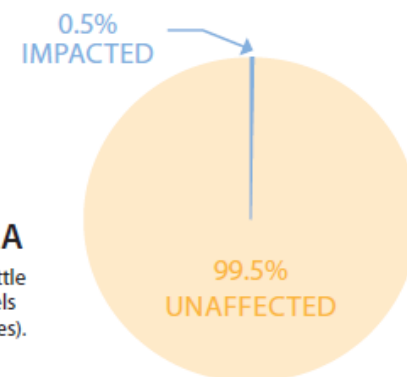
Year of Occurrence: FREQUENCY	BASELINE		IMPACTED	
	Total Area (acres)	% of Total Seattle Land Area	Total Area Impacted	% of Total Baseline Seattle Land Area*
Now: 100 YEAR 2035: ANNUALLY 2060: MONTHLY	53,238	100%		
SEATTLE LAND AREA	53,238	100%		
3FT ABOVE MHHW (12' NAVD88)			259 acres	0.5%

At 3 feet above MHHW, 259 acres - representing 0.5% of Seattle's total land area - will be impacted. The frequency of this flooding occurs as a 100-year event now, and is projected to increase to annually by 2035, and monthly by 2060.

\*The Baseline Area for inundation is the total Seattle Land Area

## 3FT IMPACTS TO LAND AREA

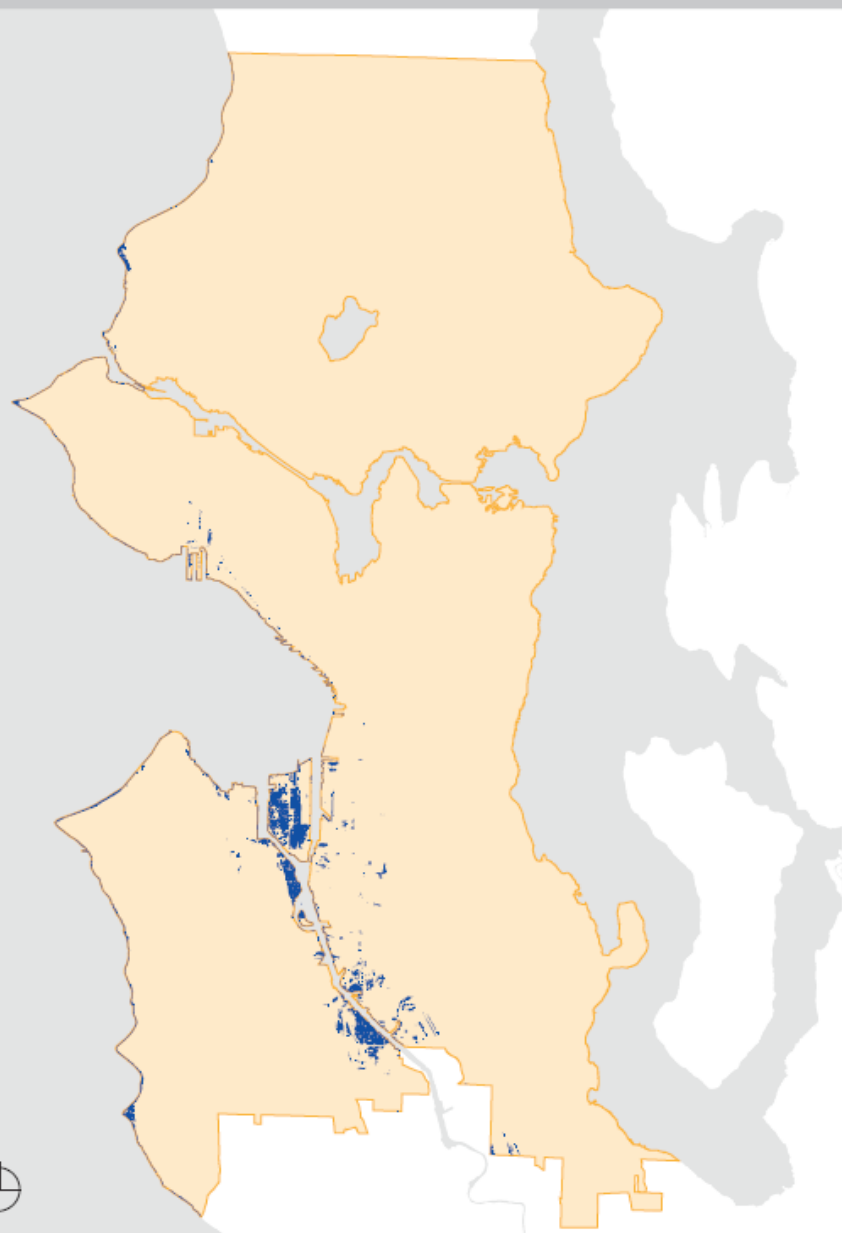
The pie chart shows the percentage of total Seattle Land Area (53,238 acres) impacted by water levels 3FT above MHHW (Total Area Impacted 259 acres).





# SEATTLE LAND AREA IMPACTS

**4FT**  
ABOVE MHHW



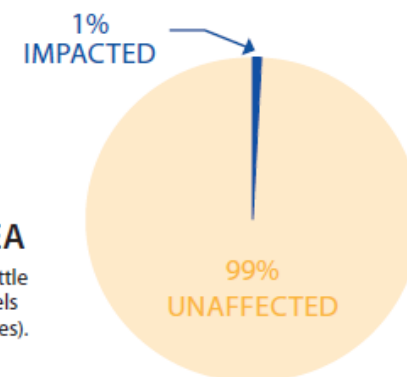
Year of Occurrence: FREQUENCY	BASELINE		IMPACTED	
	Total Area (acres)	% of Total Seattle Land Area	Total Area Impacted	% of Total Baseline Seattle Land Area*
Now: N/A				
2035: 100 YEAR				
2060: ANNUALLY				
SEATTLE LAND AREA	53,238	100%		
4FT ABOVE MHHW (13' NAVD88)			478 acres	1.0%

At 4 feet above MHHW, 478 acres - representing 1% of Seattle's total land area - will be impacted. The frequency of this flooding is projected to occur as a 100-year event by 2035, and increase to an annual event by 2060.

*\*The Baseline Area for inundation is the total Seattle Land Area*

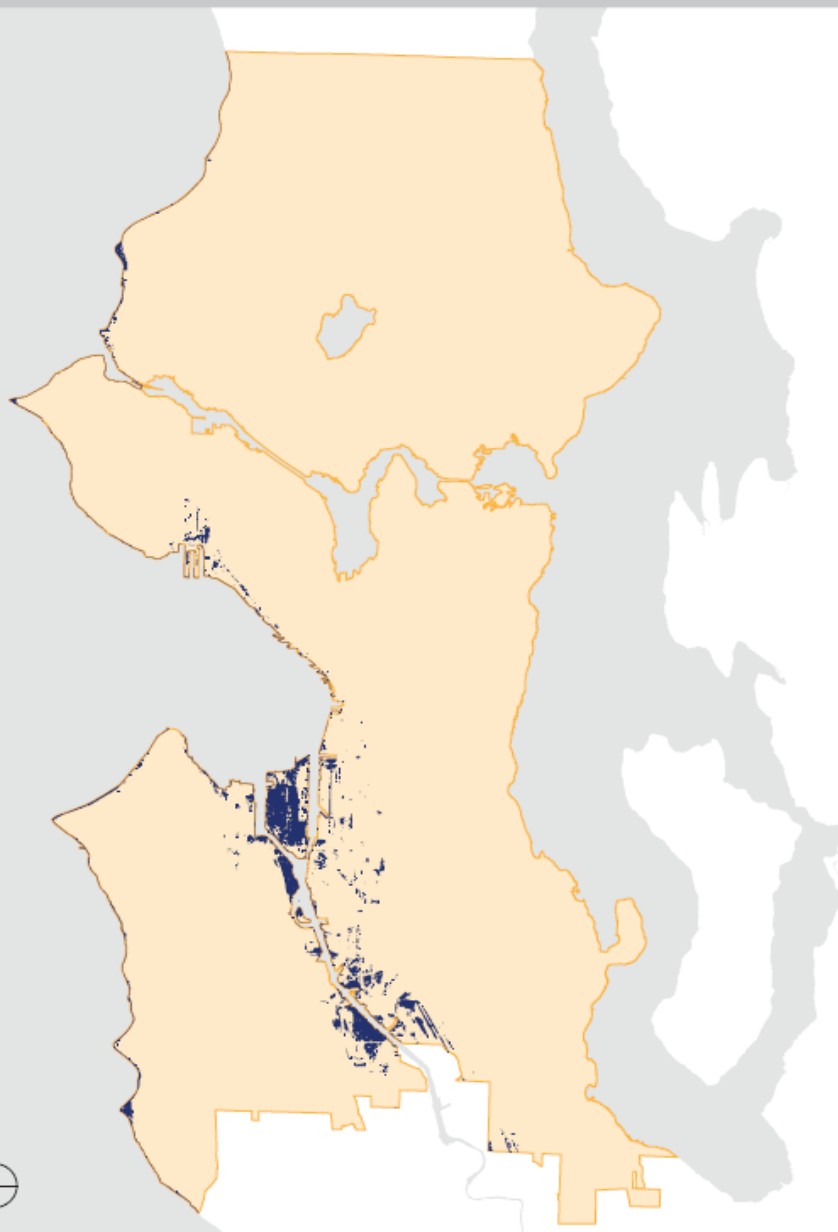
## 4FT IMPACTS TO LAND AREA

The pie chart shows the percentage of total Seattle Land Area (53,238 acres) impacted by water levels 4FT above MHHW (Total Area Impacted 478 acres).



# SEATTLE LAND AREA IMPACTS

**5FT**  
ABOVE MHHW



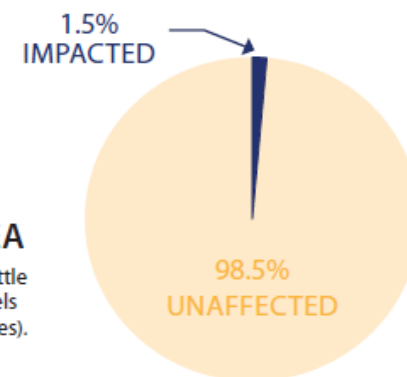
Year of Occurrence: FREQUENCY	BASELINE		IMPACTED	
	Total Area (acres)	% of Total Seattle Land Area	Total Area Impacted	% of Total Baseline Seattle Land Area*
Now: N/A				
2035: N/A				
2060: 100 YEAR				
SEATTLE LAND AREA	53,238	100%		
5FT ABOVE MHHW (14' NAVD88)			771 acres	1.5%

At 5 feet above MHHW, 771 acres - representing 1.5% of Seattle's total land area - will be impacted. The frequency of this flooding is projected to occur as a 100-year event by 2060.

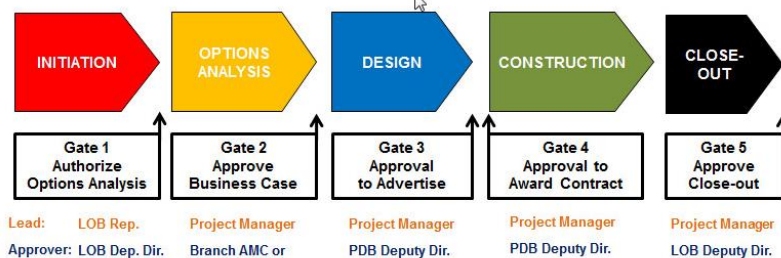
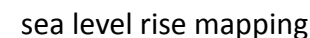
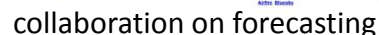
\*The Baseline Area for inundation is the total Seattle Land Area

## 5FT IMPACTS TO LAND AREA

The pie chart shows the percentage of total Seattle Land Area (53,238 acres) impacted by water levels 5FT above MHHW (Total Area Impacted 771 acres).

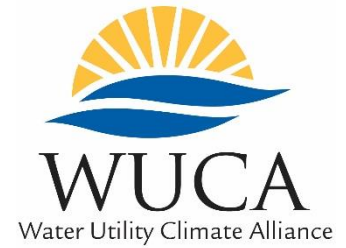


- forecasting and mapping
- focus on operations and planning
- conduct analytics, assess sensitivities



## integration into Stage Gates

# collaborative partnerships



***Mission:** The Water Utility Climate Alliances provides leadership in assessing and adapting to the potential effects of climate change through collaborative action. We seek to enhance the **usefulness of climate science** for the adaptation community and improve water management **decision-making in the face of climate uncertainty.***



Slide created by David Behar, SFPUC



# SPU's Strategic Business Plan:

- Action Plan 1 – Climate Change Adaptation and Resiliency
- Action Plan 2 – Energy Management and Carbon Neutrality

## SPU 2015-2020 Strategic Business Plan

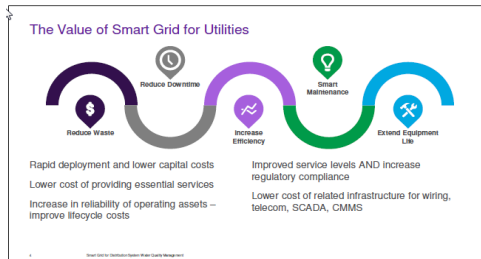
It's important to plan for climate change and rising water and sewage issues that could affect this area.

*Seattle Business Customer*

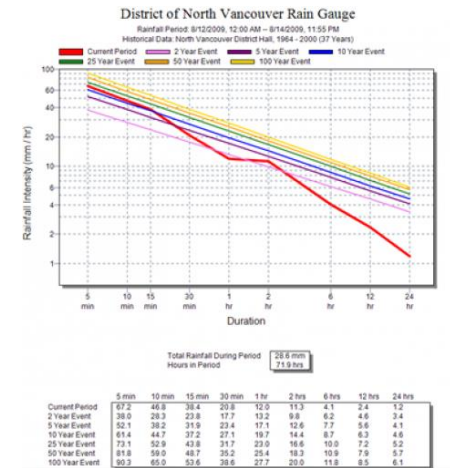


# What's coming up:

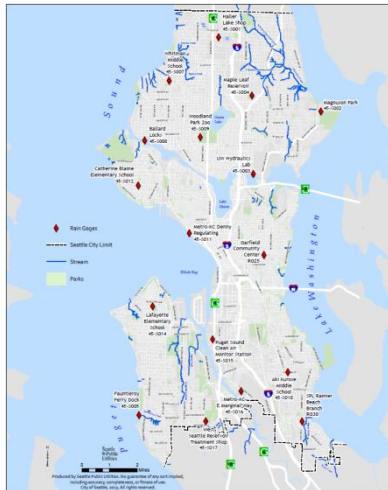
- further development of tools
- additional research, potential climate modeling
- Strategic Business Plan implementation



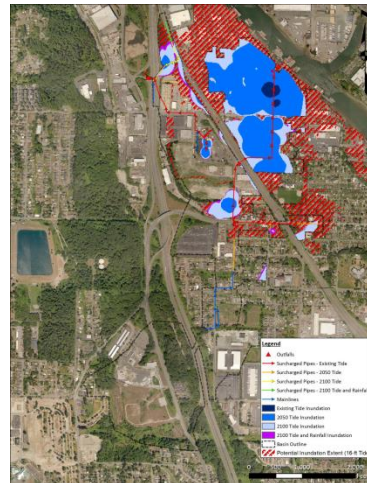
Smart city/real time control



include climate signal in IDF curves

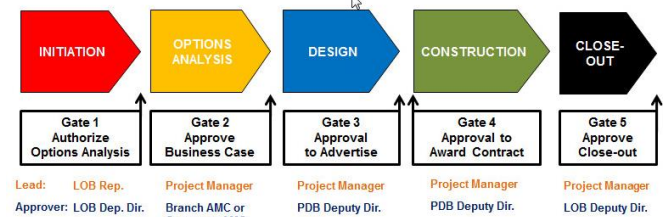


expand rain gauge network



extend CRS to non-tidal basins

## Stage Gate Process Flow for CIP Infrastructure Projects



guidance for Stage Gates



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